



BRITISH HONDURAS

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE YEAR

1966

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DEPARTMENT OF AGRICULTURE AND FISHERIES

ANNUAL REPORT

For the year ended 31st December, 1966

I. INTRODUCTION

POLICY

The basic policy of the Department remained essentially the same, namely:-

- (I) To obtain the maximum degree of self-sufficiency in respect of all crops and livestock products that can be economically produced within the country.
- (II) To improve the quality, quantity and range of export crops.
- (III) To develop the livestock industry and promote an export trade in the products thereof.
- (IV) To further develop the fishing industry and expand the range of export production.
- (V) To conserve the natural resources.
- (VI) To promote farming as a way of life based on a sound system of agriculture.
- (VII) To ensure the fullest possible integration between skill and capital input and indigenous farmers; and that national farmers participate actively in the agricultural development of the country.

2. Few countries have such a high percentage of cultivable land awaiting development as British Honduras. Poor communications both external and internal have in the past inhibited development, as has the small internal market, the lack of investment capital and skills. Much of the high potential agricultural land has been held in private ownership over many years without any development taking place. The introduction of the Rural Land Utilization Tax in January 1966 marked a major step forward in changing this state of affairs, and should result in an accelerated and more widespread rate of development.

General Review

3. The year 1966 was generally unfavourable to agriculture, it was a wet year resulting in poor weedy corn and rice crops whilst the world market prices for the major crops citrus and sugar were very depressed. Nevertheless the production of sugar at 43,453 tons was the highest so far attained, whilst the introduction of improved maize seed on a large scale gave hopes for improved yields in the future. The generally depressed state of the world market for agricultural produce highlighted the urgent need to streamline production costs. The need being made greater by the fact that much of the materials essential to productive agriculture have to be imported at comparatively high costs, nor are they readily available at short notice.

II. WEATHER

4. Most areas had above average rainfall, in some cases an increase of over twenty inches in the year. The distribution was also abnormal such that no proper dry season occurred, this prevented the milpero from getting a clean burn resulting in weed infested plots and poor yields. The normal dry spell in August did not materialise and wet conditions prevailed through to the end of the year.

III. FOOD CROPS

5. The wet conditions caused a set back in food production, this was especially severe since almost the entire production of food crops is in the hands of milperos whose methods of cultivation are particularly vulnerable to the weather conditions.

6. Beans - Red Kidney

<u>Year</u>	<u>Acreage</u>	<u>Est. Production</u> (000 lbs)	<u>Marketing Board</u> <u>Purchases</u> (000 lbs)
1962/63	1,587	1,269	747
1963/64	1,810	905	483
1964/65	1,884	1,507	584
1965/66	3,484	2,787	592

7. The crop planted late in 1965 and into the beginning of 1966 showed a marked increase in acreage largely through the interest shown in the crop by the Mennonite Community. The resulting harvest was generally good and local R.K. beans were on sale throughout 1966 in such abundance that the Marketing Board were unable to dispose of their stocks. Certified seed was again imported from the U.S.A. and the value of good seed in obtaining better results is becoming better understood.

8. Maize

<u>Year</u>	<u>Acreage</u>	<u>Est. Production</u> (000 lbs)	<u>Marketing Board</u> <u>Purchases</u> (000 lbs)
1963	13,331	6,665	228
1964	11,383	9,107	776
1965	13,390	12,051	256
1966	15,506	6,742	36

9. Seed of a synthetic maize V.S.550A was imported from Mexico with funds provided through OXFAM and distributed to all districts with each recipient agreeing to return a like amount of maize on harvesting of his crop. A total of 55,605 lbs of maize seed was distributed. The wet conditions were most unfavourable for the preparation of a good milpa, resulting in weedy poor stands in some areas, especially Orange Walk, Corozal and parts of Belize District. Cayo District on the other hand reported generally good yields of around 3,000 lbs per acre. The overall crop was however a poor one leading to domestic shortages and the need to import to meet this shortfall. The small purchases by the Marketing Board are only partly due to the smallness of the crop, increasing quantities of maize are being retained and also brought up by pig rearers and feedstuffs merchants. The full value of the introduction of the V.S. 550A is unlikely to be determined until the following year, nevertheless it holds a considerable promise.

10. Rice

<u>Year</u>	<u>Acreage</u>	<u>Est. Production</u> <u>Paddy</u> (000 lbs)	<u>Marketing Board</u> <u>Purchases</u> <u>Paddy</u> (000 lbs)
1963/64	3,131	4,695	2,718
1964/65	3,918	5,877	4,508
1965/66	6,381	7,657	5,230
1966/67	4,578	3,130	2,648

11. There was a marked drop in rice production particularly in the Toledo District. A number of factors contributed amongst these being the appalling difficulties of harvesting the record crop of the previous year using hand methods had made many growers plant only small acreages, the notice by the Marketing Board that the variety known as B.H. Creole would no longer be purchased because of the high adulteration with red rice, and the most unfavourable weather conditions which were more marked if anything in the high rainfall areas of Toledo District.

12. Seeds of Belle Patna and Blue Bonnet 50 rice were again imported from the U.S.A., these varieties have found favour with the growers but the comparatively high price of cents -/35 per lb restricts the use.

13. The production of rice together with importations and estimated consumption over the past thirteen years is given in Appendix IX.

14. Vegetables

Short-lived gluts of local produce with importation the general rule was the pattern throughout the year. Annually floods destroy vegetable crops in the Sibun River area and this year was no exception. During 1965 a venture was started to produce cucumbers for export to the U.S.A. during the winter months, at the end of the year this new industry showed every signs of success, though angular leaf spot and bacterial rot were causing some problems.

15. Plantains

Supplies are generally sufficient for the demand, with seasonal gluts, Surpluses were only available for short periods and were insufficient to sustain an export trade.

16. Other Food and Fruit Crops

Supplies of cassava flour, sweet potatoes and other ground provisions were generally adequate, irish potatoes and onions being mainly imported. The mango crop was exceedingly poor whilst the avocado production was only fair. Cold and wet weather at the blossoming stage is the likely reason for these low yields.

IV. EXPORT CROPS

17. Agricultural exports showed a further increase but marketing conditions in sugar and citrus became more depressed and returns to growers were reduced.

18. Sugar Cane

The grinding season commenced on the 15th January and ended on the 5th September being an even longer grinding season than that of the previous season which was itself a record. The long season was due partly to the wet conditions and harvesting difficulties and partly to problems with the factory. The long drawn out season and wet conditions contributed to the low T.C.T.S. of 9.4.

Sugar Cane Crop Statistics 1957/66

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
Acres cane harvested	6500	6179	7666	10058	11000	11000	13000	14000	15000	18200
Tons cane loaded	77049	89635	159017	123752	243460	213490	210362	272319	325786	411353
Tons sugar produced	7811	11067	16712	13641	27577	25817	27840	33591	35288	43453
Tons cane/acre	11.85	14.51	20.74	12.34	22.15	19.41	16.81	19.45	21.05	22.6
Tons sugar/acre	1.20	1.79	2.15	1.36	2.12	2.35	2.41	2.40	2.40	2.38
Tons cane/tons sugar	9.83	8.10	9.40	9.10	8.83	8.16	7.56	8.11	9.23	9.47
Annual Rainfall	38.24	60.19	36.26	62.09	48.54	47.58	34.57	67.68	57.22	71.73

19. Of the total the cane farmers delivered 282,640 tons and Belize Sugar Industries Ltd. 128,712 tons of cane. A total of 174,894 tons was delivered as burnt cane. The growers received \$10.46 per ton of cane.

20. Citrus

Lower prices with future prospects very uncertain, the citrus industry remained very much in the doldrums, with little or no planting or supplying and with minimal husbandry standards, excepting the larger growers. The total acreage under citrus is estimated at 8,664 acres comprising 6,414 acres of oranges and 2,250 acres of grapefruit.

Crop Statistics 1964/66

<u>Year</u>	<u>Oranges</u> (90 lb. boxes)	<u>Grapefruits</u> (80 lb. boxes)
1964/65	856,264	243,015
1965/66	952,064	247,067

21. The following citrus products were exported during 1966:

Single orange juice	3,640 tons
Single grapefruit juice	817 tons
Concentrated orange juice	3,136 tons
" grapefruit juice	120 tons
Grapefruit segments	3,483 tons
Fresh citrus	263 tons

22. The fresh citrus were exported to Mexico the bulk being oranges with smaller quantities of tangerines and grapefruit. The processed citrus was exported to the United Kingdom, Canada, U.S.A., Fizi, France and the West Indies. Growers received a gross return of -/80 cents per box delivered at the processing plants.

23. Cacao

No shipments were made during the year, the Hummingbird Development Corporation having gone into liquidation.

24. Bananas

The production of bananas increased to 169,249 boxes of 40 lbs net, all being exported to the U.S.A. Several concerns have started banana plantations and a rapid expansion in banana production for the U.S. market is expected. Leaf spot or Sigatoka disease continued to be the main production problem, mineral oil spraying being routine practice.

Banana Export Data

Boxes 40 lbs. net. ea.

1963	46,533 boxes
1964	11,337 "
1965	20,530 "
1966	169,249 "

25. Cucumbers

The Belize Offshore Growers Ltd. planted up 1,500 acres to cucumbers in 1966, involving a total of 2,600 acres, the difference of 1,100 acres being dikes, roads, swamp, and unsuabable land. Harvesting started in December 1966 when 1,250 tons were produced and 515 tons shipped. The total 1966/67 crop was:-

	December	January	February	March	Total
Shipped	515.1	1,382.4	1,004.6	568.1	3,470.2
Picked	718.0	1,780.0	1,500.0	850.0	4,840.0
Produced	1,250.0	2,000.0	2,500.0	1,950.0	8,500.0

(All figures calculated in tons)

26. Coconuts

Coconut plantations were severely damaged by the 1961 hurricane and it was necessary to import coconuts to meet the domestic requirement. By 1966 the position had considerably improved with only limited imports being required during the late spring with a small surplus for export during September/October.

27. Honey

There was an increase in the number of apiaries but a small decline in the number of hives due to one large owner selling out, with the subsequent loss of some of the hives through neglect. The position at the end of 1966 being:-

District	Apiaries	Hives	Beekeepers	Production lbs.	
				1965	1966
Corozal	88	2,610	40	167,912	215,333
Orange Walk	72	2,201	22	148,056	113,520
Belize	6	206	6	2,450	1,238
San Ignacio	6	140	4	2,004	3,300
Stann Creek	4	14	4	4,798	168
Punta Gorda	5	42	4	-	888
Caye Caulker	1	2	1	-	50
	182	5,215	81	325,220	334,497

28. During the year 256,778 lbs (114.6 long tons) of honey were exported to France and the United Kingdom, the balance being held over, after local sales of 17 tons. The average production per hive was 64.1 lbs compared with 65 lbs in 1965.

29. Tobacco

The Honduras Tobacco Company planted some 230 acres to filler and wrapper tobacco leaf. During 1966 - 35,939 lbs of leaf was exported, the wet conditions with the prevalence of moulds during 1966 made it difficult to cure and mature the leaf.

V. LIVESTOCK

30. The national herd was estimated at 36,000 head at the close of the year, whilst the number of pigs remained nearly the same as the previous year at 13,363 on the August census. Some 967 head of cattle and 1,655 pigs were exported live to Mexico. The number of cattle slaughtered within the country increased to 4,578 though much immature stock was slaughtered giving a low averaged dressed weight of 252 lbs, 1965 249 lbs. The cattle industry is not expanding as rapidly as could be due to overstocking with consequent semi-starvation and low fertility. The reluctance to clear more land and establish pastures is primarily due to the uncertainty over the completion of the meat packing plant and the likely prices to be obtained. The meat packing plant construction of which was started during the year is still unfinished and building operations have come to a standstill. The prices paid on the farm for cattle are low compared with those in adjoining areas. Best steers fetch around /20 cents B.H. per lb liveweight at the farm with most steers fetching around -/18 cents per lb.

31. Exports of live cattle, pigs, sheep and poultry to Mexico were of considerable importance and offered a good outlet at better than local prices, a total of:

967 head of cattle
2,189 pigs
184 sheep
17,403 live poultry
and 27,860 eggs were exported during the year.

32. The main health problems with cattle arose from nutrition deficiencies consequent upon overstocking and the lack of improved pastures, intensified by infestations of internal and external parasites. Swine fever remained endemic in the northern districts.

VI. AGRICULTURAL DEVELOPMENT AND EXTENSION WORK

33. General

There was a slight improvement in the staffing position, two Agricultural Officers and an Entomologist were recruited, the Agricultural Education Officer resigned whilst on study leave in Canada and the Agronomist leaves on completion of his tour in January 1967. The need to maintain the existing trials and work at the Central Farm experiment station, meant that only three of the six Districts could be headed by graduate staff, the remainder being in charge of Assistant Agricultural Officers. The farm planning unit surveyed a number of farms and drew up development plans, the lack of loan finance prevented full use being made of this service.

34. Agricultural Education

A total of eighteen courses were held during the year these courses being attended by farmers, junior departmental staff of the agricultural and Co-operative Departments. Specialised training was given in veterinary and entomological techniques. Altogether 157 persons attended the courses during the year. The School was also responsible for the horticultural section of the farm and sold some 1,237 plants as well as supplying many hundreds of young Flamboyant trees for the Nation Tree Planting Day.

35. Vegetable Trials

The Educational Section is also responsible for the vegetable trials, started in 1965 with the object of determining the best varieties for different seasons and localities, these trials are replicated at all district stations. Trials for specific projects were also undertaken with sweet peppers, cucumbers and gherkins.

36. Animal Husbandry and Pasture Work

Replanting of sixty acres to pangola grass was undertaken since these pastures had become badly infested with sour grass, management trials involving grazing, cutting with a Hayter cutter and the use of weedkillers were instituted to check the spread of sour grass. Fence line weed control was carried out with Karmex to 500 yards of fencing at a total cost of \$3.75.

37. Altogether 119 acres were planted to *Hyparrhenia rufa*, 19 acres to *Panicum maximum*, 10 acres to *Digitaria decumbens*. In addition 10 acres were planted to sweet sioux sorghum to provide dry season keep, this sorghum hybrid has prove invaluable for dry season use either by rotational grazing or for cut and carry.

38. The cattle imported late in 1965 all did well throughout the year excepting the Red Poll bull ex Jamaica which proved to be sterile. The strict culling carried out in 1965, along with the new breeds and stock imported provided Central Farm with foundation herds of excellent quality.

39. Some limited trials were undertaken on finishing off of steers in feed lots but no conclusive results were obtained.

40. Some 200 acres of land was cleared from thick forest, ploughed and planted with corn, excessively wet condition made weed control and harvesting difficult and only a comparatively small quantity of corn was in fact harvested.

41. The Duroc Jersey pigs which had not proved satisfactory were discarded in favour of large whites obtained in late 1965 from Jamaica, these pigs have proved outstandingly good with large uniform litters.

42. Some persian type sheep were obtained from the Yucatan, Mexico, these sheep were hardy and practically woolless an advantage where burrs and sticking seeds are common, unfortunately they have little meat and it is hoped to obtain some good rams to improve the carcass.

43. Agricultural Shows

Two major and two minor shows were held during the year, namely the Western Region Show at Trapiche, Cayo District, the Stann Creek Show in Stann Creek Town, and the San Felipe and Chan Pine Ridge Shows. Most of the shows had a tendency to over emphasize the carnival aspects at the expense of agriculture.

44. Fisheries.

The lobster statistical programme started in July 1965 continues. All information gathered for the 1965/66 lobster season was compiled during the months - March to July which is the closed season. There was still a marked reluctance to provide statistical data. All fishing co-operatives were visited and discussions were held with other fishermen and radio talks were given to explain the aims and objects of the statistical programme. These activities aided the collection of data to some extent. However it is felt that the percentage of return is not good enough, and that regulations to make it compulsory will have to be passed.

45. The F.A.O. Marine Biologist left the country in July and a replacement was due to arrive in September. However he could not be recruited earlier, so it was intimated that he would arrive in January 1967. An F.A.O. Fish Processing Technologist arrived in the country in August, to advise on, and improve quality standards of fisheries products, and processing plants, hygiene and methods. A counterpart, a Food and Fish Processing Inspector was appointed so as to enable continuity when expert assistance is withdrawn. Recommendations for Basic Regulations for handling lobsters were made. These were discussed with the fishermen who agreed on the necessity of regulations for an improved product. Apart from the on the job training programmes were outlined for U.N. Fellowships for the Fisheries Officer and Food and Fish Processing Inspector tenable during 1967.

46. The lobster season started on July 15th and at the end of December 274,352 pounds of tails were exported. A marked decrease compared to 1965 for the same period when 389,586 pounds of tails were exported. A total of 497,136 pounds of tails was for the 1965/66 lobster season. Total export quota for 1965/66 season is 451,000 pounds of tails. It is doubtful whether this amount will be exported as production is low although there has been a slight increase in the number of active fishermen.

47. Plans for a research vessel and a laboratory have been acquired and construction should start early in 1967.

48. Export prices for frozen lobster tails averaged at the beginning of the season U.S. \$1.85 but by December had fallen to U.S. \$1.50.

49. The statistical programme will continue and plans are being made for a lobster tagging programme for 1967 for migration, growth, mortality and population studies.

VII. INVESTIGATIONS

50. Work continued along the following lines:-

- (1) To conduct research into major food crops (corn, sorghum, rice, beans, forage crops etc.) with the aim of increasing the yield and quality of these crops economically, efficiently and in accordance with good crop husbandry and management.

- (2) To devise and establish suitable crop rotation system in order to encourage a more sedentary agriculture which will benefit the farmers of the country through better land management and utilization.
- (3) To establish a closer liaison with the extension staff so that relevant results of trials will be put into practical use more quickly and the immediate problems of the farmers will be similarly recognised.
- (4) To work with private industry whenever possible to further the above objective.
- (5) Trials as far as possible will be conducted in two phases preliminary and intensive, on agricultural stations and/or specific environmental zones by the Research Division, and (b) extensive simple demonstration trial on the farmer's land by the individual farmer or groups of farmers under the supervision of the Extension Officers.
- (6) To give technical advise, lectures and broadcast as required.

Soybeans (Glycine max.) Variety Trial

Five varieties of soybeans were introduced to Central Farm to study the environmental response to yield and growth. The germination percentage of all the varieties was about 90%. The seedlings progressed well until the second week after germination at which time torrential rains caused severe waterlogging throughout the entire block.

There was also a slight infestation of insects *Diabrotica* spp. which was controlled with sevin. Caterpillars also caused reduction in yield. Because of this no statistical analysis was done.

Table 1 gives the results in lbs/acre, and the average yield of the varieties.

TABLE I

Yields of Soybean variety in lbs/acre - Central Farm

Varieties	Block I	Block II	Block III	Block IV	Average.
San Pablo	715	576	1,584	715	898
Blanca	612	324	900	594	608
Acadian	715	432	666	468	570
X.L.M.	306	468	342	864	495
Harbin	198	715	558	288	440

A sixth variety Improved Pelican was later introduced, but climatic conditions were highly unfavourable. The results obtained were also highly erratic (average was 185 lbs per acre. Soybean (*Glycine max.*) spacing and plant population trial.

The improved Pelican variety was tested for growth and yield in regards to different spacing.

Due to heavy rains that fell during this experiment, and the fact that the soils on which the trial was laid out was poorly drained, the results obtained were quite erratic. As a consequence of this, only the results obtained will be recorded. No statistical calculation was deemed necessary due to waterlogging and insects infestation.

Table 11 gives the results of the spacing trial in lbs/acre.

TABLE II								
1 foot				1½ feet				
	1"	2"	3"	4"	1"	2"	3"	4"
Block I	217	124	52	206	387	500	205	137
Block II	619	278	495	185	364	648	182	364
Block III	1,145	1,340	784	825	1,342	887	1,001	762
Total	1,981	1,742	1,331	1,216	2,093	2,035	1,388	1,263
Average	660	581	444	405	698	678	467	421

	2 feet				2½ feet			
	1"	2"	3"	4"	1"	2"	3"	4"
Block I	216	151	476	108	319	137	319	159
Block II	497	649	396	519	546	546	1,285	353
Block III	1,189	1,395	692	915	1,047	1,138	614	1,308
Total	1,902	2,195	1,514	1,542	1,912	1,821	2,218	1,820
Average	634	732	505	514	637	607	739	607

3 feet				
	1"	2"	3"	4 "
Block I	278	265	480	391
Block II	556	354	328	429
Block III	1,603	859	859	984
Total	2,437	1,478	1,667	1,804
Average	812	493	556	602

From Table II it can be seen that Block III gave the most favourable yield, however, because of the erratic results obtained from the other blocks, statistical analysis was considered useless.

Grain Sorghum (Sorghum vulgare) variety and fertilizer trial.

Grain sorghum is considered a very important livestock feed in developed countries. It is a very important drought resistant crop, and for this reason it can be grown under semi arid conditions. This property makes sorghum an ideal crop for this country during the dry season. Also it is envisaged that in the future, it will be a very important supplementary feed for livestock.

The objectives of this experiment were, therefore, twofold:-

1. To find a suitable variety that will grow well producing high quality and yield.
2. To find the level of fertilizer required to insure this objective.

Site - Central Farm

Soil type - Guxu Brown Clay

Experimental design: A 2x5x5 randomized split plot with two replications.

Sample plot size: 1/200th of an acre.

Summary of Results

Two varieties, Kiowa and Pawnee were tested at Central Farm using different rates of phosphatic and nitrogenous fertilizers.

Table 3 shows the average yields of the Kiowa variety with different levels of fertilizer.

TABLE 3.

Average yields of Grain Sorghum (Kiowa) in lbs/acre.					
	P ₀	P ₁	P ₂	P ₃	P ₄
N ₀	1,137	1,100	1,246	1,286	1,166
N ₁	1,919	905	1,237	1,913	1,638
N ₂	1,181	2,200	1,331	863	1,481
N ₃	1,719	1,819	994	2,513	1,681
N ₄	*825	*825	888	2,100	1,662
Sum					

The table above shows the highest average yield to be 2,513 lbs/acre with the application of 300 lbs sulphate of ammonia and 150 lbs triple superphosphate.

Average yields of Grain Sorghum (Pawnee) in lbs/acre					
	P ₀	P ₁	P ₂	P ₃	P ₄
N ₀	1,056	1,162	1,613	*2,050	1,656
N ₁	2,250	1,113	1,275	1,963	1,444
N ₂	1,225	1,625	*813	1,619	1,363
N ₃	1,237	1,256	1,437	2,450	1,544
N ₄	*1,250	1,694	2,869	*700	-
Sum					

Key:	P ₀	- Control - 0 lbs/acre
	P ₁	- 50 lbs/A Triple superphosphate
	P ₂	- 100 lbs/A Triple superphosphate
	P ₃	- 150 lbs/A triple superphosphate
	P ₄	- 200 lbs/A triple superphosphate
	N ₀	- 0 lbs/acre sulphate of ammonia
	N ₁	- 100 lbs/acre " " "
	N ₂	- 200 lbs/acre " " "
	N ₃	- 300 lbs/acre " " "
	N ₄	- 400 lbs/acre " " "

The results obtained are varied due to severe waterlogging in some parts of the trial block. Table 4, however shows that the highest average yield (2,689 lbs/acre) was realized with the application of 400 lbs Sulphate of Ammonia and 100 lbs Triple superphosphate per acre.

The loss of some trial plots due to waterlogging is very unfortunate, as these could probably have shed some more light on the rate of fertilizer required to produce good quality and high yields of grain sorghum in this country. From the results obtained awnee appears to be a more suitable grain sorghum for this country than Kiowa. Because this is the first experiment care should be taken in the interpretation of the results for general application.

Red Kidney Beans (*Phaseolus vulgaris*) Main Fertilizer Trials

The correct application rate of fertilizer on food crops has been one of the main factors contributing toward steady increases in many developing countries.

The objectives of this trial was to study the effect of different rates of the major nutrients on the growth and yield of Red Kidney Beans.

It is hoped that the results from these trials will help to shed some light on the need and requirements of fertilizer for this country.

- Sites: (a) Toledo Agricultural Station
(b) Benque Viejo, Agricultural Station
(c) San Antonio (Dump area)
(d) Stann Creek Agricultural Station.

Experimental Design - All experiments were of the randomized block design of twenty seven treatments.

Plot size: All sample plots were approximately .003% acre.

Summary and results

A variety of Red Kidney Beans (Californian) was tested throughout this country at some of the Agricultural Stations using different rates of N.P.K. fertilizers.

It was found that: (a) in Punta Gorda a mixture of 200 lbs sulphate of ammonia and 100 lbs triple superphosphate with 0 lbs muriate of potash per acre seemed to be quite adequate for high yields. (b) in Toledo (San Antonio) a mixture of 100 lbs sulphate of ammonia 100 lbs triple superphosphate and 0 lbs muriate of potash per acre was quite adequate for high yields. (c) at the Stann Creek Agricultural Station a mixture of 200 lbs sulphate, and 0 lbs muriate of potash per acre gave the highest average yield.

b) For the Agricultural Station in Benque Viejo, Cayo District, the highest average yield was realised at the rate of 100 lbs sulphate of ammonia, 200 lbs triple superphosphate and 0 lbs muriate of potash.

T A B L E 5

Yields of Red Kidney Beans in lbs/acre - Punta Gorda

	P ₀				P ₁				P ₂			
	K ₀	K ₁	K ₂	Sum	K ₀	K ₁	K ₂	Sum	K ₀	K ₁	K ₂	Sum
N ₀	539	161	270	470	610	161	790	1,562	413	251	341	1,005
N ₁	377	790	521	1,688	1,302	179	808	2,307	341	287	216	884
N ₂	431	323	700	1,454	1,633	539	879	3,051	1,302	700	1,740	3,742
Sum	1,347	1,274	1,491	4,112	3,545	880	2,477	6,920	2,056	1,328	2,297	5,591

T A B L E 6

Yields of Red Kidney Beans Expressed as Percentage of the Highest Yield_P - Punta Gorda

	P ₀				P ₁				P ₂			
	K ₀	K ₁	K ₂	Sum	K ₀	K ₁	K ₂	Sum	K ₀	K ₁	K ₂	Sum
N ₀	31	9	16	56	35	9	45	89	24	14	22	58
N ₁	22	45	30	97	75	10	47	132	20	16	12	48
N ₂	25	19	40	84	94	31	51	176	75	40	100	215
Sum	78	73	86	239	204	50	143	397	119	70	132	321

From the data set out in Table 5 and 6 it can be seen that:- 1. yields increased about one and a half time with P₁ in the presence of N₁ and N₂ in contrast to P₁ no N.

2. Yields increased approximately one and a third times with N₁ or N₂ in the presence of P₀.

3. Potassium effect was negligible and erratic.

TABLE 7

Yields of Red Kidney Beans in lbs/acre - Dump Area

	P ₀				P ₁				P ₂			
	K ₀	K ₁	K ₂	SUM	K ₀	K ₁	K ₂	SUM	K ₀	K ₁	K ₂	SUM
No	1041	467	933	2441	682	574	682	1938	1077	574	682	2333
N ₁	808	682	808	2298	826	754	1113	2693	503	754	844	2101
N ₂	718	467	1041	2226	754	933	1041	2728	861	539	969	2369
Sum	2567	1616	2782	6965	2262	2261	2836	7359	2441	1867	2445	6803

TABLE 8

Yields of Red Kidney Beans expressed as percentages of the highest yield - Dump Area Toledo District.

	P ₀				P ₁				P ₂			
	K ₀	K ₁	K ₂	SUM	K ₀	K ₁	K ₂	SUM	K ₀	K ₁	K ₂	SUM
N ₀	94	42	84	220	61	52	61	174	97	52	61	210
N ₁	73	61	73	207	75	70	100	245	45	70	76	191
N ₂	65	42	94	201	70	84	94	248	77	48	87	212
Sum	232	145	251	628	206	206	255	667	219	170	224	613

The results obtained from this trial were quite erratic. Tables 7 & 8 give some indicative results. They show that with P₁, N₁ & N₂ increased significantly over No. They also indicate that potassium fertilizer had no effect on yields.

TABLE 9

Yields of Red Kidney Beans in lb/acre - Agricultural Station - Benque Viejo

	P ₀				P ₁				P ₂			
	K ₀	K ₁	K ₂	SUM	K ₀	K ₁	K ₂	SUM	K ₀	K ₁	K ₂	SUM
N ₀	861	1722	1435	4018	2189	2314	1687	6190	2476	1435	1705	5616
N ₁	1400	2404	2296	6100	1974	1256	2350	5580	2548	1794	1740	6082
N ₂	1705	1579	2422	5706	2009	2225	2117	6351	2225	2009	2153	6387
SUM	3899	5705	6153	15824	6172	5795	6154	18121	7249	5238	5598	18085

TABLE 10

Yields of Red Kidney Beans - Agricultural Station - Bonque Viejo

Expressed as percentages of the highest yield.

	P ₀				P ₁				P ₂			
	K ₀	K ₁	K ₂	Sum	K ₀	K ₁	K ₂	Sum	K ₀	K ₁	K ₂	Sum
N ₀	34	68	56	158	86	91	66	243	97	56	67	220
N ₁	55	94	90	239	77	49	92	218	100	70	68	238
N ₂	67	62	95	224	79	87	83	249	87	79	74	240
Sum	156	224	241	621	242	227	241	710	284	205	219	708

From Tables 9 & 10 it can be seen that there was a significant increase over the control with the application of 100 lbs & 200 lbs triple superphosphate. The application of Nitrogen and Potassium Fertilizers caused varied yields.

Since Red Kidney Beans is a legume, more work is required before any statements can be made as to its need for Nitrogenous fertilizers.

TABLE II

Yields of Red Kidney Beans in lb/acre - Stann Creek Agstat

	P ₀				P ₁				P ₂			
	K ₀	K ₁	K ₂	Sum	K ₀	K ₁	K ₂	Sum	K ₀	K ₁	K ₂	Sum
N ₀	359	790	359	1508	1579	574	790	2943	861	718	431	2010
N ₁	144	718	861	1723	718	861	718	2297	1292	1364	1005	2661
N ₂	933	1148	718	2799	1866	790	1148	3804	1794	1148	1005	3847
Sum	1436	2656	1938	6030	4163	2225	2656	9044	3947	3230	2441	9618

TABLE 12

Yields of Red Kidney Beans expressed as Percentages of the Highest Yield

Agricultural Station, Stann Creek

	P ₀				P ₁				P ₂			
	K ₀	K ₁	K ₂	Sum	K ₀	K ₁	K ₂	Sum	K ₀	K ₁	K ₂	Sum
N ₀	19	42	19	80	85	31	42	158	46	38	23	107
N ₁	8	38	36	92	38	46	38	122	69	73	54	196
N ₂	50	62	38	150	100	42	62	204	96	62	54	212
Sum	77	142	103	322	223	119	142	484	211	173	131	515

Table II & 12 show a very interesting effect with the high rate of Phosphate (P₂). With the high phosphorus level, as the potash level increasing yields were decreased. Also as the level of phosphate increased, yields were also increased.

The phenomenon which was demonstrated in the trial at Stann Creek will be researched further before any definite statements can be made.

Key: P₀- 0 lbs. Triple Superphosphate per acre

P₁- 100 lbs. " " " " "

P₂- 200 lbs. " " " " "

N₀- 0 lbs. Sulphate of Ammonia per acre

N₁- 100 lbs. " " " " "

N₂- 200 lbs. " " " " "

K₀- 0 lbs. Muriate of Potash per acre

K₁- 100 lbs. " " " " "

K₂- 100 lbs. " " " " "

Red Kidney Beans Fertilizer Rate Trial

Introduction and Objectives

(1) Farmers in this country are in the habit of changing farming site yearly. As a result of this, much of the good farm lands are being poorly utilised.

The objective of this experiment was to demonstrate to farmers that crops can be grown on the same site each year economically if adequate fertilizer is applied.

- (2) Sites :
- (a) Cayo District
 - (b) Stann Creek District
 - (c) Toledo District
 - (d) Orange Walk District

Experimental Design:

- (3) All experiments were of the randomized block design of 8 treatments.
- (4) Sample plot size: All sample plots were approximately 1/280th of an acre.

Summary of Results

(5) A variety of Red Kidney Bean (Californian) was yield tested in this country using different rates of fertilizers. The highest yields obtained in the districts are as follows.

- (a) Cayo 2347 lbs/acre with 600 lbs. of 12:24:12/acre
- (b) Stann Creek 2159 lbs/acre with 700 lbs 12:24:12/acre
- (c) Toledo District 1037 lbs/acre with 600 lbs of 12:24:12/acre
- (d) Orange Walk 468 lbs/acre with 300 lbs of 12:24:12/acre.

Table 13 shows the results obtained from trials in the Cayo District. Cayo District Yields of Dry Kidney Beans in lbs/acre. Using 12:24:12 fertilizer.

TABLE 13

Treatments	1	2	3	4	5	6	S.E.	Total	Mean
0	2901	1290	861	1005	396	1719	356	12172	1362
1	2652	1719	969	1542	681	2151	298	9714	1619
2	3117	2007	1005	1542	1443	2007	297	11112	1852
3	3117	2436	1290	1362	897	1863	336	10965	1827
4	3438	2436	1326	2328	1182	2007	336	12717	2119
5	3117	2580	1326	1827	1542	1290	304	11618	1947
6	2716	2865	1578	2223	1917	1791	332	14802	2347
7	4299	2865	1290	2544	1254	1578	483	13830	2305

From Table 13 it can be seen that treatment six gave the highest average yield. This, however, is at a rate of 600 lbs. 12:24:12 per acre. Therefore a more economical point of application would be at 400 lbs./acre which gave an average yield of 2119 lbs./acre. Table 14 shows the results obtained from trials in the Toledo District.

Toledo District Yields of Dry Red Kidney Bean in lbs./acre. Using 12:24:12 Fertilizer

TABLE 14

Plots

Treatment	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
0	432	108	558	753	573	396	573	0	72	36	72	144	162	2151	6030
1	861	144	540	1005	717	1005	645	216	897	1146	216	1719	126	2724	11961
2	1005	54	468	717	573	1470	1911	1578	288	1218	252	1719	54	1719	13026
3	717	-	573	769	1146	2023	861	645	789	432	108	1146	144	2436	11789
4	1146	432	645	1005	861	2292	1182	861	504	1146	540	-	324	2436	13374
5	1005	180	789	717	288	1686	1218	1077	1146	1398	252	-	252	3009	13017
6	717	252	825	540	573	1542	2151	1290	468	1254	789	-	360	2724	13285
7	1290	-	1005	681	609	1650	1290	1506	861	573	144	-	645	2151	12405

Toledo District Average Yields of Red Kidney Beans in lbs/acre.

Using 12:24:12

TABLE 15

Code	Mean	S.D.	S.E.
0	464	595	165
1	854	701	188
2	930	681	182
3	907	662	183
4	1029	658	183
5	1001	772	214
6	1037	750	214
7	1033	556	160

From Table 15 it can be seen that 600 lbs. of fertilizer gave the highest mean yield of 1037 lbs./acre. However, at the rate of 300 lbs./acre, 930 lbs. were obtained, an increase of approximately 500 lbs./acre over the control. Stann Creek District Yields of Dry Kidney Beans in lbs/acre.

TABLE 16

Plots

Treatments	1	2	3	4	5	6	7	8	Total	Mean	S.D.	S.E.
0	1254	540	1254	432	1578	591	861	1146	7656	957	412	141
1	789	1719	1146	180	1146	1005	2436	1434	9855	1232	665	235
2	933	324	2079	681	1146	1146	2151	2436	10896	1362	766	322
3	1182	1254	2079	504	1290	1578	1434	2292	11613	1452	544	192
4	1182	645	1398	789	1863	2007	2007	2796	12689	1586	718	254
5	1542	1146	2364	1005	2292	2151	2865	2937	16302	2038	735	260
6	861	1542	933	1791	2007	2292	2724	3153	15303	1913	808	286
7	1578	1578	1863	1434	2007	2580	2580	3654	17274	2159	746	264

From Table 16 it can be readily seen that 2159 lbs/acre is the highest average yield for Stann Creek District, but this is at the highest level of fertilizer (700 lbs per acre). Since there is no significant difference between 2159 and 2038, a more economic level of application would be at the 500 lbs/acre rate.

The results obtained from the Orange Walk Trials are shown in Table 17.

Yields of Dry Red Kidney Beans in lbs/acre. Using 12:24:12 Fertilizer

Table 17

Treatment	Plots		Total	Mean	S.D.	S.E.
	1	2				
0	432	228	720	360	102	72
1	216	252	468	234	25	18
2	288	-	288	288	-	-
3	504	432	936	468	51	36
4	432	360	792	396	51	36
5	396	360	756	378	19	13
6	288	360	648	324	51	36
7	324	360	684	342	25	18

It is not possible to make evaluation of the results obtained from Orange Walk District, as there were only two trials, both of which produced very erratic results.

Cayo and Stann Creek District

The results from trials in these Districts indicate that high yields of Dry Red Kidney Beans can be realised with proper fertilization and management.

Results obtained from the other two Districts were too inconclusive for any specific recommendations. More work is needed in these areas under strict supervision and technical assistant before any statement can be ventured in regards to their productivity potential.

Arable/Ley Rotation Trial

Introduction and Objectives

Research into rotation and alternate husbandry farming systems in this country has been brought to the foreground by the need (a) to develop sedentary agriculture (i.e. a move away from the milpa system) with its economic husbandry and social advantages. (b) To encourage full time farming and farmers aid. (c) To find viable methods of combining pasture fodders, arable crops and livestock into profitable systems.

An ultimate husbandry farm unit system was established at Central Farm to lead the way in developing more productive farmingsystem and to solve any problems of the unit which may emerge during the course of the trial.

Plan of the Arable /Ley Rotation Sequence for a
Six Year Cycle

Year	Block 1	Block 2	Block 3	Block 4	Block 5	Block 6
1967	B/R	Ley	Ley	M/B	M/B	Ley
1968	B/R	Ley	Ley	M/B	Mu/B	Ley
1969	Mu/B	M/B	Mu/B	Ley	Ley	Ley
1970	Ley	S/M/B	M/B	Ley	Ley	M/B
1971	Ley	S/Mu	M/B	Ley	Ley	M/B
1972	Ley	Ley	M/B	Ley	M/B	M/B

Code:

B - Red Kidney Beans

R - Rice (Upland varieties)

M - Maize (corn)

Mu - Maize under sown with ley.

VIII. PEST AND DISEASE

A. Important insect pests observed during the year were the banana weevil, Cosmopolites sordidus, the coconut weevil Rhynocophorus palmarum, the diamond-back moth, Plutella maculipennis, the cabbage looper Trichoplusia ni. Many hemipterous bugs were found feeding on fruit, such as Leptoglossus zonagra, on citrus and tomato and Largus Varians on a wide range of cultivated fruits. Galerucid beetles were responsible for a great deal of damage to foilage of vegetables the most damaging species being Diabrotica balteata. Rice and maize appeared to be relatively free of serious pests.

The Mexican Fruit Fly, Anastrepha ludens which breeds in citrus fruit, particularly grapefruit in the Stann Creek Valley, caused losses to citrus growers. It was found that it has alternative hosts such as guava, Psidium guyaya and hogplum, Spondias mangifera. A number of insect species attach stored produce and Lasioderma serricorne caused losses in locally manufactured cigarettes.

B. Research

The following tentative research programme was started:-

1. Investigation into fruit flies attacking citrus to determine what species occur, their breeding patterns, alternative hosts and distribution.
2. Survey of insect species attacking citrus and other crops of agricultural importance within the territory.
3. Investigation to determine whether insect control could enhance the quality of fruit for export, where this is lowered by insect attack.
4. Establishment of an insect reference collection.
5. Biological control of noxious insects and weeds.

Investigations have so far shown that Anastrepha ludens is the most important fruit fly attacking citrus, to date it has only been found in the Stann Creek Valley. The Coreid bug Leptoglossus gonagra invaded citrus orchards in the Stann Creek Valley, where the adults fed on oranges in large numbers; this insect does not appear to feed on cultivated host plants. The attack took place towards the end of the citrus season, so no very serious damage was done. Trichoplusia ni did damage to tobacco foliage in the field in the Cayo District, but was eventually controlled by applications of Bacillus thuringiensis.

Mediterranean Fruit Fly, Ceratitis capitata is not known to occur in this Territory. However, routine trapping in Corozal, Belize and Toledo Districts was instituted during the year, using plastic Steiner traps with Trimedlure attractant. No flies of this species had been taken during the year in any of the traps.

Training

As a necessary adjunct to the establishment of an insect collection, training of departmental staff in collecting technique was undertaken. By the end of the year, a Farm Demonstrator from all districts except one, had received such training. A Farm Demonstrator was posted to the section as from October 1st and another in Stann Creek undertook part time duties for the investigation of citrus insects and did much useful work.

ANIMAL HEALTH

Animal health has shown a marked improvement throughout the year, partially due to the increased efforts by the staff, one of whom deserves particular mention, and partially due to the fact that there was no discernable dry season this year, pastures thus stood up far better to overstocking than at present plagues the cattle industry. Swine fever has not been the problem this year as it has been in previous years, partially due to the fact that the supplies of crystal violet vaccine were available throughout the year and vaccination had been stepped up. No large scale outbreaks were recorded and a report of an outbreak in the Toledo District went unproven. Vaccination was carried out in that area for the first time for some years. Vesicular Stomatitis has not occurred to any extent throughout the year and although it is traditionally most evident at this time of the year no outbreaks have been recorded. Particular success in treating affected cattle has been achieved by the use of aerosols containing Gentian Violet and Chloramphenicol or Aureomycin. Quick isolation of infected cases also helped to prevent the spread of the disease last year. Screw worms, ticks and internal parasites still remain the greatest drain on livestock production although considerably more cattle, horses and pigs have been wormed than in previous years. There is no doubt that regular worming and spraying improves even the indigenous livestock beyond all recognition. On Central Farm, the health of the livestock has been exceptionally good this year, except for apparent infertility in the imported Red Poll Bull which has set back the breeding programme for the Red Poll herd. In the case of the pigs there was a high degree of crushing early in the year, result of bad breeding policy undertaken by a Peace Corps representative, the result of which was more sows farrowing down at one time than the Department had facilities for, since then however a more practical policy has been introduced by the Livestock Officer. Deaths due to disease in the pigs and the cattle were extremely low. The cattle continue to be TB free and the dairy herd free from Brucellosis. At the time of writing all Government owned cattle have been tested for TB and are now free. In addition all the dairy herds except two have been tested for TB and screened for Brucellosis using the Milk Ring Test. Beef herds throughout the country continue to be tested and at the time of writing approximately one third of the cattle population has been tested.

D. RESEARCH

Investigation into the variety and distribution of ticks including their wild vectors is being undertaken and investigations are also being carried out concerning the internal parasites of livestock and their relative importance. As previously pointed out, this is only proceeding at present at a slow pace but it is anticipated that it will speed up with the completion of the laboratory in the new year.

The pig disease and distribution survey has now been completed and similarly the observations on the results of Artificial insemination carried out a year ago. The simple comparative liveweight gain trial involving Pangola and Jaragua has also been completed. The pastures will now be rested and rejuvenated prior to the parasites investigations intended for next year.

E. EXTENSION SERVICES

The staff were active throughout the year and a large number of visits were made to farmers both to treat animals and to advise farmers. The Veterinary Officer visited all districts during the year. A number of broadcasts were made on animal health for the departmental radio programme 'Farming for Progress' and Village Chairmen were circularised on numerous occasions in order to keep them informed of the latest developments and to enable them to point out to their village farmers the benefits to be gained from the regular use of anthelmintics and vaccines etc. Also use was made of this to forewarn the villagers of seasonal diseases and the method of treatment.

F. LIVESTOCK IMPORTS

During the year there were only three importations of livestock of any size namely approximately 30 head of cattle imported by the Mennonites consisting of Brown Swiss Heifers and Bulls, 24 Head imported by Guy N. Nord Ltd., consisting of 14 Santa Gertrudis Bulls, 6 heifers and 4 quarter horses, two stallions and two fillies, the third large importation was by Bull Run Overseas Ltd., who imported a number of Brahman Bulls. All the importations were from the U.S.A. Tick Fever did not prove to be serious, only one of the imports died, a Brown Swiss imported by the Mennonites. One of the most noticed feature of livestock imported from the U.S.A. is the large percentage which are infected with lungworm, it would appear of value therefore to advise any prospective importer to ensure that any such imports are wormed i.e. for lung worms prior to shipment - Diethyl Carbamazine citrate, and Cyanoethyldrazine are both most effective and to be recommended and Methyradine is also said to be valuable in such cases.

IX. LAND CLEARING UNIT

During the year the Land Clearing Unit worked in the Orange Walk, Belize and Cayo District for both farmers and the Department including some small jobs for P.W.D. and the Town Board.

The system of working the unit has remained basically the same as last year, in the District the machines are sent to the Agricultural Officer he is then responsible for the work in his District and all collection of revenue, repairs are carried out by the Agricultural Engineer and his staff, the Agricultural Engineer and his staff also gives advice when requested.

Work at Central Farm was carried out on improving existing pastures clearing the remaining land by the river to increase pasture and arable land, in the Horticultural section to tidy up the place and increase the acreage for experiments and educational purposes also drainage throughout the farm, an attempt was made to get through this programme during the year however with the wet conditions the drainage had to be left undone.

During the year our rates of charging have been either by the hour or the acre. Hour charges being encouraged whenever possible. The acreage rate being from \$75.00 per acre to \$120.00 depending on the type of bush to be cleared, hourly charges being:

D7 \$15.00 per machine hour
D4 6.00 per machine hour.

The drivers were paid a basic rate of \$150.00 per month with either \$5.00 or \$8.00 per acre bonus again depends upon the type of bush, if working by hour they received \$.50 per hour bonus, this method of payment has produced better results in the amount of work produced but a watch has to be kept to see that it is for of the same quality as the quality of the work can drop in the rush to earn bonus.

A decision was made during the year that we should withdraw from Land Clearing as much as possible with exception of special schemes Government work for the small farmers as the small farmers can seldom afford to have his land mechanically cleared unless under some scheme whereby he is given time to repay. Other special case apart from the above required the approval of the Ministry of Natural Resources.

X. STAFF

A list of the senior staff is given in Appendix I. The posts of Soil Chemist, Plant Pathologist and Cane Farming Officer were not filled during the year, whilst that of Agricultural Education Officer was only temporarily filled.

XI. ACKNOWLEDGEMENTS

Continued help and co-operation was given to the Department by other Government Departments, commercial concerns and private individuals, this help has been greatly appreciated.

Chief Agricultural Officer

APPENDIX I

Senior Staff Postings at 31st December, 1966

<u>Title</u>	<u>Name</u>	<u>Station</u>
Chief Agricultural Officer	E.W.King	Belize City
Ag. Agricultural Education Officer	A.L. Navarette	Central Farm
Agronomist	M.W.Silvey	Central Farm
Veterinary Officer	C.W.B.Hatherill	Central Farm
Livestock Officer	O.O.Orio	Central Farm
Agricultural Engineer	J.B.Hutchinson	Central Farm
Veterinary Field Officer	F.F.Orio	Belize City
Entomologist	J.D.McCrae	Central Farm
Agricultural Officers	R.S.Pitt	Stann Creek
	G.C.Aguilar	Orange Walk
	G.C.Ellis	Corozal
	N.E.Wade	Central Farm
Asst. Agricultural Officers	J.A.Lizana	Corozal
	J.A.Swasey	Stann Creek
	C.D.Atkins	Belize District
	T.L.Brackett	Toledo District
	W.A.Grant	San Ignacio
	T.T.Ramos	Belize City
Fisheries Officer	C.G.Rosado	Belize City.

SUMMARY OF RAINFALL 1966

DISTRICTS AND STATIONS	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	Total 1966	Total 1965	Average 10 Years
<u>COROZAL DISTRICT</u>															
Corozal Agstat	1.15	3.13	2.74	3.06	11.36	10.06	6.14	11.19	12.33	5.17	2.00	.72	69.05	70.50	52.61
Corozal Sugar Factory	3.53	1.64	3.21	2.00	3.25	16.04	8.77	7.35	8.49	2.24	1.12	N/A	N/A	50.21	50.84
Cane Station(San Roman)	7.25	1.97	Nil	1.24	9.78	17.74	7.03	6.21	6.76	1.70	8.45	3.60	71.73	57.22	N.S.
<u>ORANGE WALK DISTRICT</u>															
Yo Creek	3.64	2.74	2.28	.69	9.32	14.48	7.72	5.79	9.31	9.58	1.64	2.11	70.28	61.54	N.S.
Hill Bank	Nil	2.15	7.21	2.77	3.25	16.69	7.46	5.99	12.70	1.63	2.74	.65	63.24	N.S.	N.S.
<u>BELIZE DISTRICT</u>															
Belize International Airport	6.59	5.38	6.33	2.57	1.56	20.45	12.59	7.28	14.29	6.64	7.71	4.00	95.39	70.97	60.60
Gracie Rock	4.78	1.80	4.99	5.55	Nil	17.88	10.14	11.24	11.76	3.45	5.94	4.39	81.92	71.91	69.38
Maskall	3.89	3.67	5.29	.80	6.92	10.78	11.25	7.65	11.69	5.41	6.90	5.75	80.00	71.53	69.48
Ambergris Caye	6.47	4.17	5.99	.80	5.83	13.33	4.33	6.09	13.15	8.22	4.68	2.13	75.19	52.18	N.S.
Belize City (Landivar)	4.86	5.65	5.46	.85	1.45	14.10	7.63	5.86	11.26	9.18	11.38	4.61	82.29	80.39	N.S.
Big Falls	5.61	2.04	5.27	3.41	2.43	16.13	5.90	5.97	12.09	3.50	3.94	2.56	68.88	N.S.	N.S.
<u>CAYO DISTRICT</u>															
Central Farm	6.93	1.31	2.97	2.27	1.86	16.15	6.44	6.76	4.71	4.49	4.96	1.42	60.27	61.69	60.15
Augustine Pineridge	5.24	3.00	4.57	2.68	3.04	13.81	7.15	5.46	10.87	6.72	5.28	4.60	63.93	54.24	60.65
Gooma Cairn	10.91	5.66	8.66	2.33	3.10	17.29	15.26	6.00	8.47	8.60	11.09	9.79	102.14	89.45	N.S.
Norland	6.79	1.50	3.87	2.40	2.29	16.69	6.66	6.79	4.32	4.07	4.75	2.72	62.05	59.54	60.22
Mai Camp	9.58	3.59	4.54	2.18	3.42	16.41	5.89	3.54	7.19	3.57	8.02	3.95	71.88	56.67	N.S.
Sibun Hill	10.03	4.59	6.01	4.36	1.93	18.80	9.44	5.74	9.09	6.91	5.31	8.94	91.15	85.54	N/A
Benque Viejo	3.77	1.77	1.50	1.04	2.96	10.91	6.14	6.30	9.25	6.89	6.94	3.27	61.74	33.19	N/A
San Ignacio	5.64	1.43	4.23	.78	3.98	17.31	5.33	5.47	5.52	5.51	5.35	2.92	63.47	80.19	N/A
<u>STANN CREEK DISTRICT</u>															
Stann Creek Agstat	6.38	3.31	8.30	6.68	4.86	22.01	9.56	8.22	9.58	8.89	6.80	4.79	99.16	95.82	84.33
Pomona	6.50	6.10	6.76	8.26	8.80	17.29	10.97	10.75	12.54	8.18	6.96	5.31	108.42	104.55	94.57
Middlesex	6.77	4.91	5.09	5.02	9.74	18.96	16.94	14.34	10.73	7.55	8.25	4.70	121.50	120.29	105.42
Melinda Forest Station	5.92	2.85	Nil	6.07	4.30	23.34	9.58	7.53	9.92	5.91	5.02	4.44	84.88	96.29	N.S.
Savannah Forest Station	2.85	3.03	4.61	4.78	5.91	14.72	12.16	10.22	16.12	10.94	3.78	4.94	94.06	94.20	N/A
Sittee River	2.59	1.48	8.56	5.19	4.17	15.36	13.48	10.69	12.42	7.22	3.51	6.37	82.60	88.80	N/A
Melinda Farm	4.74	1.71	7.39	4.34	6.20	20.03	8.71	8.23	9.46	7.54	4.36	5.43	88.14	77.37	N/A
Cabbage Haul	4.96	2.67	5.80	6.07	4.92	11.56	14.26	11.68	13.95	N/A	N/A	N/A	N/A	N.S.	N.S.
<u>TOLEDO DISTRICT</u>															
Punta Gorda Town	3.95	5.79	6.26	1.19	12.49	28.54	21.98	25.60	29.54	11.88	3.75	6.78	157.75	N/A	160.22
Agstat Toledo	6.59	3.14	8.10	3.10	9.19	26.39	25.92	23.04	23.18	12.74	3.70	5.46	150.55	133.23	165.15
Machaca Forest Station	7.03	3.70	9.63	4.59	5.92	25.38	17.77	17.63	17.97	8.59	5.73	4.52	128.46	128.53	126.40
Monkey River Town	4.77	2.35	3.25	14.00	2.78	15.47	7.82	10.00	18.13	7.00	6.40	4.56	145.71	94.39	N.A.
Barranco	2.87	3.13	5.93	2.01	9.28	18.82	24.76	20.40	21.03	8.54	4.37	5.25	123.58	172.85	N/A
San Antonio	1.22	.20	1.84	6.54	6.54	15.42	8.44	9.44	1.53	8.19	4.70	5.57	69.63	114.20	N/A

Note: N/A - Not available
N.S. New station

APPENDIX Nº IV

LIST OF AGRICULTURAL EXPORTS

Articles	QUANTITIES	VALUE
Bovine Cattle	967 head	110,992
Sheep and Goats	184 "	964
Swine (live)	2,189 "	92,838
Poultry (live)	14,181 "	26,644
Eggs	16,495 doz.	10,001
Fresh Fish	162,858 lbs.	41,946
Lobsters (tails)	387,927 lbs.	564,647
Shrimp	23,065 lbs.	19,897
Conch	135,844 lbs.	35,263
Fish (dried, smoked or salted)	45,961 lbs.	10,386
Crab claws	20 lbs.	5
Turtle	1,860 lbs.	627
<u>Fruits and Vegetables</u>		
Oranges (fresh)	258 tons	10,922
Tangerine "	15 tons	230
Grapefruit "	$\frac{1}{2}$ tons	
Papayas	20,872 lbs.	1,700
Plantains and Bananas	217,637 bunches	217,814
Corn	200,000 lbs.	9,295
Cocomuts (whole)	205,875 nuts	15,495
Other Edibles	180 lbs.	50
Other Fresh Fruits	24,865 lbs.	1,115
Preserved fruits and nuts	34,300 lbs.	2,093
Grapefruit Segments	3,801 tons	1,772,383
Grapefruit Concentrate	126 tons	46,839
Orange Concentrate	3,127 tons	1,628,921
Grapefruit Juice	818 tons	177,184
Orange Juice	3,703 tons	1,001,827
Chicle	196,880 lbs.	187,808
Molasses	10,453 tons	235,959
Unrefined sugar	43,120 tons	6,492,014
Natural Honey	256,778 lbs.	40,872
Sweet Orange Oil	64 tons	97,168
Orchid Plants	4,134 plants	150
Beans, Peas and Lentils	14,095 lbs.	12,000
Tomatoes	240 lbs.	45

MEAN MONTHLY MAXIMUM TEMPERATURE

	Belize Int'l Airport	St. John's College (Landivar)	Agutat Yo Creek	Agutat Yo Creek	Agutat Yo Creek	Agutat Yo Creek	Holinda Forest Station	Ambergris Cayo	Coona Cairn	Ambergris Cayo	Ambergris Cayo	Central Farm Cayo	Savannah Forest Station	Cabbage Haul	Sibun Hill
January	81.0	79.5	84.8	80.0	N.A.	73.4	82.0	N.A.	67.4	75.1	80.4	76.4	80.4	79.7	85.7
February	81.9	81.6	86.3	82.0	N.A.	78.0	84.3	83.3	71.0	78.0	78.0	82.0	84.0	79.7	70.0
March	83.1	83.0	89.5	82.0	87.0	81.0	83.0	86.0	74.0	79.0	N.A.	N.A.	86.0	N.A.	71.0
April	87.9	87.6	92.2	86.0	88.3	86.4	87.5	88	79.7	86.0	80.2	87.0	89.8	84.0	73.0
May	89.0	89.0	92.7	87.0	90.0	89.0	88.	90.5	82	89	89	89.9	87	87	81.0
June	86.9	86.2	90.2	86.0	89	80.1	87	N.A.	77.8	86	87.3	86.3	89	85.0	74.0
July	87.7	87.4	90.8	87.0	N.A.	80.0	83.0	92.0	79.0	86.0	86.0	85.1	85.0	85.5	76.0
August	87.9	88.0	91.7	87	N.A.	86.0	89.0	91.0	79.0	86.0	N.A.	86.0	87.0	85.0	76.0
September	87.9	87.2	91.1	87.0	N.A.	87.0	85.0	90.7	78.0	84.0	83.7	85.5	86.0	87.0	81.0
October	87.2	86.6	90.0	85.7	N.A.	84.3	88.2	90.4	75.8	82.1	89.0	85.3	83.8	N.A.	84.1
November	82.9	81.4	88.9	81.3	N.A.	77.8	87.3	85.1	67.8	75.0	84.5	80.4	76.5	N.A.	75.6
December	80.7	79.7	89.0	79.0	N.A.	77.5	81.4	83.0	67.0	75.0	85.0	78.0	73.7	N.A.	74.0

MEAN MONTHLY MINIMUM TEMPERATURE

January	65.7	68.0	N.A.	66.0	64.4	65.0	74.5	N.A.	59.3	61.5	62.8	64.5	70.2	65.5	57.8
February	68.0	70.3	60.0	60.0	65.0	60	67.0	72.5	61.0	60.5	64.0	66.3	69.0	74.3	79.0
March	68.3	72	59.2	67.0	65.0	61.0	73.0	73.0	62.0	63.0	N.A.	65	71.0	N.A.	61.0
April	74.8	77.9	73.0	73.0	64.6	71.2	73.3	78.0	67.4	69.0	N.A.	70.0	74.2	70.9	62.7
May	74.4	78.0	69.0	73.0	62.0	75.0	74.0	78.0	69.0	71.0	N.A.	71.5	84	71.0	65.0
June	74.2	76.6	69.3	74.0	67.3	77.3	77.	76	68.8	70	N.A.	76.3	76.5	71.0	64.0
July	74.8	77.7	73.4	74.0	N.A.	70.0	78.0	76.0	69.7	67.0	N.A.	72.9	73.0	71.0	63.0
August	75.5	78.0	71.5	75.0	N.A.	69.0	76.0	79.0	69.0	69.0	N.A.	70.0	79.0	71.0	64.5
September	74.1	76.4	70.7	73.0	N.A.	71.0	73.0	78.7	68.0	73.1	N.A.	71.8	81.0	74.0	65.0
October	71.9	75.4	71.5	71.0	N.A.	71.1	74.7	76.9	66.1	68.4	N.A.	69.8	80.2	N.A.	65.1
November	64.0	67.7	N.A.	65.0	N.A.	69.0	61.2	70.6	60.3	62.0	N.A.	64.6	73.1	N.A.	63.6
December	63.9	67.7	N.A.	65.0	N.A.	66.0	57.0	69.0	59.2	62.0	N.A.	64.3	71.6	N.A.	59.6

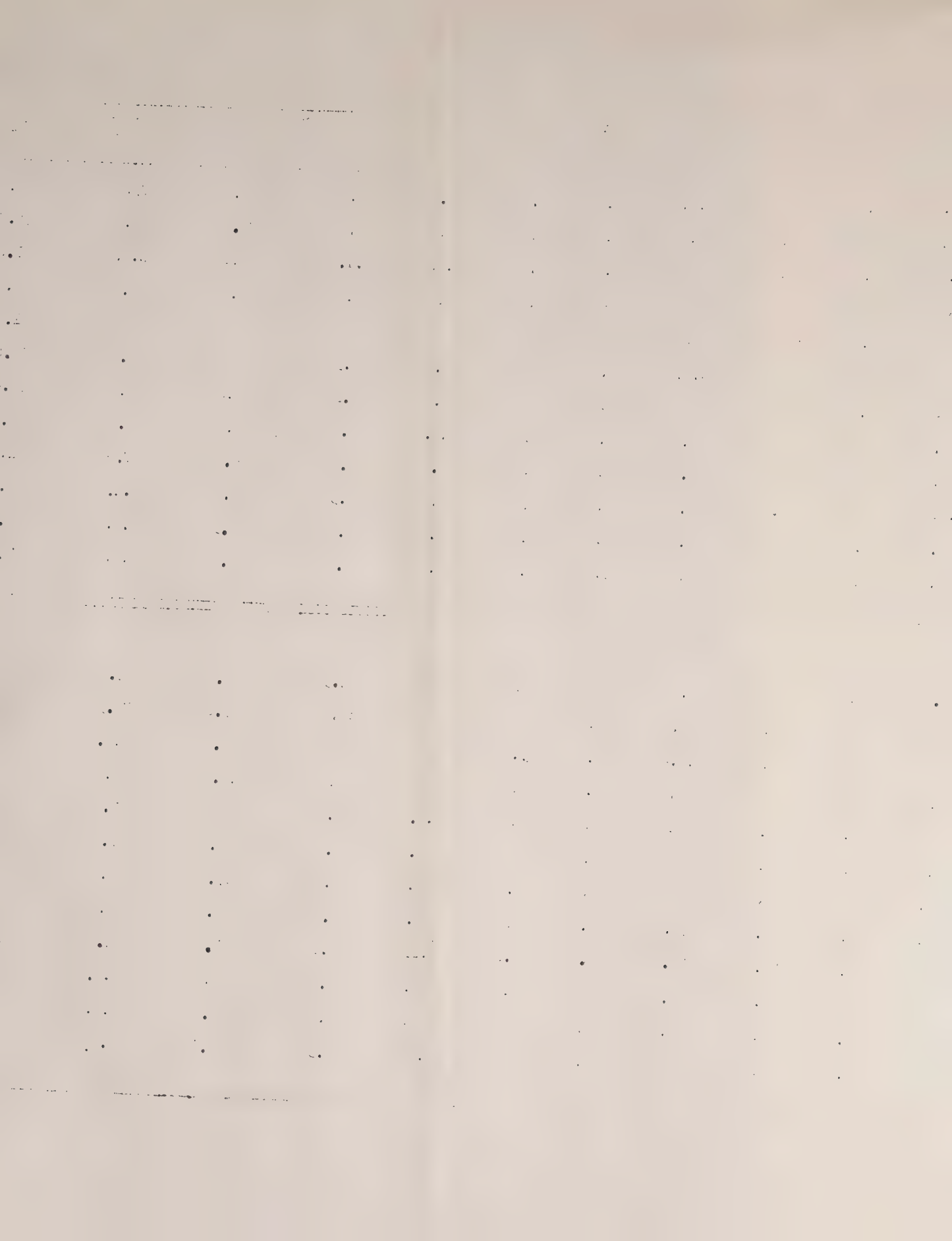
METEOROLOGICAL DATA 1966

MEAN MONTHLY RELATIVE HUMIDITY %

MEAN MONTHLY BAROMETRIC PRESSURE

	Belize Int'l Airport	Agstat Yo Creek	Agstat Stann Creek	Cabbage Haul	Agstat Toledo	Augustine Mountain Pinridge	Helinda Forest Station	Cooma Cairn Forest Station	Mai Forest Station	San Roman Cane Station	Sibun Hill	Central Farm Caye	Savannah Forest Station	Belice Int'l Airport	Agstat Yo Creek	Agstat S/Creek	Agstat Toledo	Amber- gris Caye	San Roman Cane Station	Savannah Forest Station	Central Farm Caye
January	85	87.5	89	88.1	90.7	91	83.5	93.8	84.5	79.7	89.3	89.1	81.1	29.96	29.99	30.05	29.56	29.94	N.A.	N.A.	N.A.
February	74	88.8	87	85	88	86	82	88	86	82.8	79	87	74	29.97	29.99	30.12	29.54	29.60	N.A.	N.A.	N.A.
March	81	77.4	84	84	86	85	79	86	84	92	79	83	81	29.96	30.03	30.12	29.57	29.97	N.A.	N.A.	N.A.
April	79	89.7	88	86.3	82.9	79.6	77.9	79.9	72.6	87	72.5	85	75.8	29.90	29.95	30.11	29.45	29.87	29.42	N.A.	N.A.
May	75	81.3	86	85	81	57	81	72	69	89	69	84	N.A.	29.89	29.95	30.11	29.42	29.86	29.40	N.A.	N.A.
June	84	76.9	N.A.	85.7	86.2	85.3	80	86	83	N.A.	84	79.9	75.5	29.88	29.90	30.04	29.39	29.83	29.33	N.A.	29.95
July	87	81.1	91	86	N.A.	82	85	79.6	75.4	N.A.	80	82	74.0	29.91	29.95	30.09	N.A.	29.84	29.34	N.A.	29.96
August	82	78.9	90.4	88.0	N.A.	82	83	79	79	N.A.	76	84	79	29.92	29.93	30.12	N.A.	29.87	29.29	N.A.	30.10
September	85	85.7	N.A.	79.0	N.A.	83	82	82	79	N.A.	70.0	84.0	78	29.87	29.87	30.07	N.A.	29.82	29.30	N.A.	29.97
October	83	90.4	N.A.	N.A.	N.A.	86.2	82.2	83.7	80.6	N.A.	75.2	84.6	78.0	29.87	29.91	30.02	N.A.	29.82	29.31	N.A.	29.95
November	82	86.9	N.A.	N.A.	N.A.	88.4	81.6	91.2	80.0	N.A.	85.0	88.0	79	30.00	29.86	30.17	N.A.	29.98	29.43	N.A.	30.10
December	84	93	N.A.	N.A.		77.7	81.4	93.0	86.0	N.A.	83.0	90.4	83.7	29.90	29.91	30.16		29.96	29.42	N.A.	30.13

N.A. - Not available



LIST OF AGRICULTURAL PRODUCTS

Articles	QUANTITIES	VALUE
Bovine Cattle	937 head	110,992
Sheep and Goats	184 "	964
Swine (live)	2,189 "	92,838
Poultry (live)	14,181 "	26,644
Eggs	16,495 doz.	10,001
Fresh Fish	162,858 lbs.	41,946
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Oranges (fresh)	258 tons	10,922
Tangerine "	15 tons	230
Grapefruit "	$\frac{1}{2}$ tons	
Papayas	20,872 lbs.	1,700
Plantains and Bananas	217,637 bunches	217,814
Corn	200,000 lbs.	9,295
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Other Edibles	180 lbs.	50
Other Fresh Fruits	24,865 lbs.	1,115
Preserved fruits and nuts	34,300 lbs.	2,093
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Chicle	196,880 lbs.	187,808
Molasses	10,453 tons	235,959
Unrefined sugar	43,120 tons	6,492,014
Natural Honey	256,778 lbs.	40,872
Sweet Orange Oil	64 tons	97,168
Orchid Plants	4,134 plants	150
Beans, Peas and Lentils	14,095 lbs.	12,000
Tomatoes	240 lbs.	45

LIVESTOCK

List of Main Treatments carried out by the Staff of the Department
of Agriculture in 1966

Diseases or Treatment	Horses	Cattle	Pigs	Sheep	Poultry	Dogs
Castration	60	266	245	-	-	5
Distemper	5	-	-	-	-	40
Mange	28	17	4	18	-	6
Wounds and Screw						
Worm Infestation	41	78	10	-	3	6
Worming	79	4,829	463	23	301	54
Colic	20	2	1	1	4	9
Infectious Warts	1	22				
Fowl Pox					207	
Coccidiosis		7			338	
Pneumonia (all causes)		4	17			1
Spraying	7	2,554	31	3		
Influenza	8		15			3
Removal Placenta		5	4			
Preventive Vaccinations	4	7	112			3
Newcastle Disease					425	
Rabies			22			
Hog Cholera			506			
Stomatitis	12	15	13			
Scours	1	8	22			3
Respiratory Vaccinations	1	22	197		4	3
Fowl Cholera					86	
Serum Injections			20			
Lampas	12					
Swine Fever			50			
Tetanus	9		1			1
Food Poisoning					20	
Colds	6	1	2		449	3
T.B. Testing		60				
Fractures	3	4	1			1
Limber Neck					86	
Enteritis		2	75			
Meningitis						3
Swollen Joints		3	8			
Abcess		3	4	1		
Constipation	2	8	6			1

STATUS OF LOBSTER EXPORT QUOTAS1966 - 67 Lobster Season15 July-31st December 1966.

ALL IN POUNDS ON TAILS .

EXPORTERS	Allocated Quota	Total Shipped	Remaining Quota
Maribaña Producers Coop. Society Ltd.	140,000	90,080	49,920
Northern Fishermen Coop. Society Ltd.	140,000	87,752	52,248
National Fishermen Producers Coop. Society Ltd.	120,000	72,880	47,120
Placencia Producers Coop. Society Ltd.	45,000	22,840	22,160
Toledo Fishermen Coop. Society Ltd.	6,000	800	5,200
TOTAL	451,000	274,352	176,648

TOTAL EXPORTS OF LOBSTER TAILS FOR 1966 AMOUNT TO 378,997 POUNDS

NOTE:- The Toledo Fishermen's Coop. has only made one shipment of 800 pounds, on August, 27th, 1966, under its export quota. Since then this Cooperative has delivered to Northern Fishermen, their processors and exporters, an additional amount of 1,909 lb. of tails, which to my understanding has been exported under Northern's Quota.

31st December, 1966.

EXPORTS OF FISHJANUARY - NOVEMBER 1966

	Country	Weight in Pounds	Declared Value \$
Fish Fresh, Chilled or Frozen	Guatemala Honduras U.S.A.	134,508	\$39,783.00
Fish - Dried, Salted or Smoked	Guatemala Honduras	49,961	10,386.00
Conch	Guatemala Honduras U.S.A.	131,594	33,895.00
Turtle	U.S.A.	1,865	627.00
Shrimp	U.S.A.	23,065	19,897.00
Crab Claws	U.S.A.	20	5.00
			<u>\$104,593.00</u>

Note:- The returns on exports from Stann Creek and Punta Gorda have not been received for the month of December.

EXPORT OF LOBSTER TAILS

July 15 - December 15, 1966

Exports	Pounds Exported	Pounds Declared in Statistics	Percentage Declared	No. of Lobster Fishermen	Av. No. of Fishermen Giving Statistics	% of Fishermen Giving Statistics	No. of Lobster Shipped	Average Weight of Tails
Caribeña Producers Cooperative	76,080	50,661	66.6	144	33	22.9	160,133	7.6
Northern Fishermen's Cooperative	78,672	23,061	29.3	133	16	12.0	207,225	6.1
National Fishermen Producers Cooperative	69,640	33,044	47.5	133	30	22.6	176,787	6.3
Placencia Producers Cooperative	17,520	8,310	47.4	62	6	9.7	28,610	9.8
Toledo Producers Cooperative	800	851	100.00	16	6	37.5	1,381	9.3
TOTALS	242,712	115,927	47.8	488	91	18.7	574,136	6.8

APPENDIX NO VIII.

CATCH STATISTICS DATA PROVIDED BY LOBSTER FISHERMEN

NUMBER OF FISHERMEN GIVING RETURNS PER MONTH

15th JULY - 15th DECEMBER 1966

Name of Cooperative	No. of Lobster Fishermen							Lb. of Tails	
		15/7-15/8 16/8-15/9 16/9-15/10 16/10-15/11 16/11-15/12						Quota Received	Exported up to 31st December
Caribeña Producers Cooperative	144	39	29	40	38	19		140,000	90,080
Northern Fishermen's Cooperative	133	15	15	11	4	33		140,000	87,752
National Fishermen Producers Cooperative	133	24	29	35	32	33		120,000	72,880
Placencia Producers Cooperative	62	9	5	7	5	9		45,000	22,840
Toledo Fishermen's Cooperative	16	5				7		6,000	800
Totals	488	92	78	93	83	101		451,000	274,352
Percentage of Sample		18.9	16.0	19.1	17.0	20.7			

RICE PRODUCTION

YEAR	FADDY PURCHASES BY MARKETING BOARD	EQUIVALENT CLEAN RICE	EST. TOTAL PRODUCTION CLEAN RICE	FIVE YEAR MOVING AVERAGE	MARKETING BOARD IMPORTATIONS	EST. CONSUMPTION ON FIVE YEAR MOVING AVERAGE
1954/55	499,407	259,688	370,980	-	3,689,922	-
1955/56	718,692	373,724	533,890	-	3,887,655	-
1956/57	1,301,610	676,832	992,620	-	2,000,000	-
1957/58	1,724,709	896,844	1,281,060	-	3,500,000	-
1958/59	1,850,188	962,104	1,374,430	910,596	1,800,000	3,886,112
1959/60	1,090,619	567,112	810,160	998,432	5,800,000	4,395,963
1960/61	1,561,534	811,980	1,159,970	1,123,648	1,000,000	3,943,648
1961/62	1,967,423	1,023,048	1,461,490	1,217,422	2,500,000	3,937,422
1962/63	1,625,384	845,208	1,207,440	1,202,698	4,000,000	4,022,698
1963/64	2,718,006	1,413,360	2,019,080	1,331,628	3,500,000	4,491,628
1964/65	4,557,887	2,370,108	3,385,870	1,846,770	2,250,000	4,298,770
1965/66	5,229,331	2,719,496	3,751,024	2,364,981	2,250,000	5,057,636
1966/67	1,978,419)* 669,813)	1,028,778)* 408,586)	1,878,196	2,448,325	3,000,000	5,448,320
	2,648,232	1,437,364				

*Tennessee)
Big Falls) Dry Season 1967

